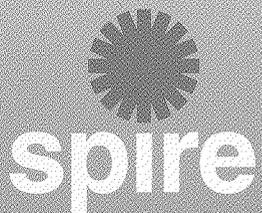


# ANNUAL REPORT 2010



11006153



Making the equipment that  
leads the worldwide PV market

## President's Letter

A message from Chairman & CEO  
Roger G. Little



**Roger G. Little** Chairman & CEO

### Dear Stockholders, Customers and Employees:

**W**e recorded our fourth straight year of record revenues in 2010, with nearly \$80 million in sales. Over 80% of our revenues came from our solar business. Growth was driven by strong worldwide sales of photovoltaic (PV) module manufacturing equipment and turn-key lines, sales of solar cells to module line customers, and rapid growth of our re-established Solar Systems business. Spire once again placed on *Boston Business Journal's* prestigious Book of Lists as one of the fastest-growing public companies in Massachusetts, and we were ranked fifth among cleantech employers in New England by *Mass High Tech*.

#### **Spire Products**

Spire's business remains focused in three primary areas: PV manufacturing equipment sales, turn-key production lines, and module system installations. Sales of Spire's equipment, particularly our sun simulation (flasher) systems, remained very strong throughout 2010. In March, we announced the sale of our 100th Spi-Sun Simulator™ 4600 SLP, a significant accomplishment since the model was only introduced one year prior. Our simulators are considered the gold standard in the industry and are being used by many UL and CE module qualification laboratories throughout the world.

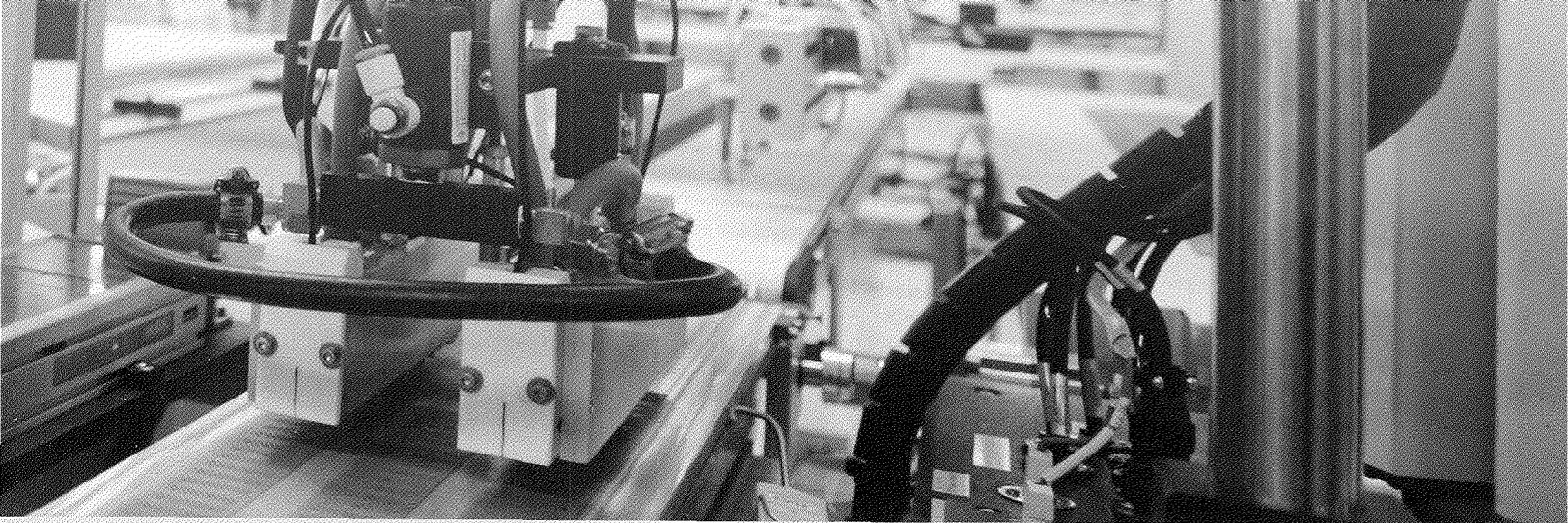
We continue to set ourselves apart from the competition by helping our customers become successful. Embedded in our equipment and turn-key lines are the process recipes necessary for successful cell and module manufacturing. Additionally, we provide the world-class support services only possible from a company with Spire's extensive knowledge and experience in the industry.

#### **Turn-key Lines**

Spire installed and expanded a number of turn-key lines in 2010. Among the more notable of these was the addition of more than 50 Megawatts (MW) to Solaria Energia's module production line in Fuenmayor, Spain, and the installation of a 25 MW per year module manufacturing line for Wanxiang Solar in Rockford, Illinois. Wanxiang is part of a joint venture to develop and operate a 62 MW solar PV electric generation facility in that city, which will be the largest solar power facility in the Midwest when it becomes operational in 2011. Also in 2010, Spire delivered a 50 MW/year module manufacturing line to Federal Prison Industries, Inc. (UNICOR) for a Federal prison facility located in Sheridan, Oregon.

#### **Solar Systems**

In addition to our equipment and lines, we have been very pleased with the performance of our Solar Systems business since re-establishing it in 2009. This business unit, which provides design, installation and maintenance services for



large-scale PV systems, represented more than 10% of our overall revenues in 2010. Our success in this area is driven by our highly consultative approach, whereby we navigate clients through the complex set of decisions and regulations required for a successful PV installation.

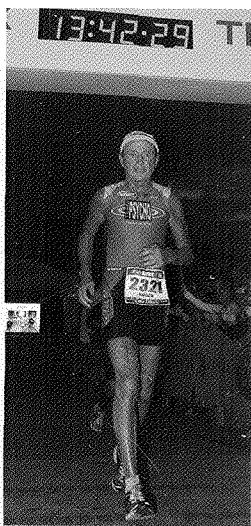
### Continued Innovation

Spire continues to innovate, driving advancements in the industry with the development and introduction of new products and services. In October, Spire announced that it had produced the world's most efficient solar cell, a concentrator PV cell with a peak efficiency of 42.3%. We also developed a new large area simulator for thin film modules, and introduced a 20 MW/year module assembly line offering new PV market entrants over 30% reduction in normalized capital expenditures. Further, Spire received grants from the Department of Energy to develop new products including an LED-based simulator and a non-contact photoluminescent system for early detection of microcracks in solar cells.

### The Future

Nearly 40 years ago Spire was one of the first companies to enter the solar market. The industry has taken decades to develop, and in that time many companies have entered and exited the

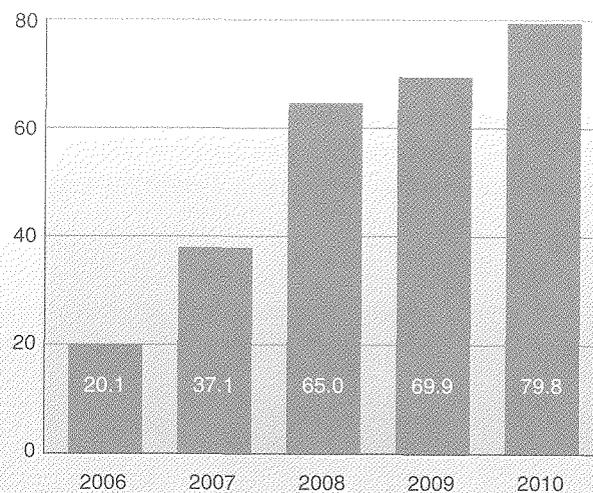
market. By continually innovating and adapting, Spire has persevered and thrived, becoming a leading worldwide supplier of PV module manufacturing equipment. The "Spire" brand is very strong throughout the world. Our established market position, global reach, ability to understand our customers' needs, and our history of innovation have positioned us well to capitalize on the rapid growth of the solar industry.



Roger places 2nd at Ironman Lake Placid

Roger G. Little, Chairman & CEO

### Spire Total Annual Revenues (\$M)



*"By continually innovating and adapting, Spire has persevered and thrived, becoming a leading worldwide supplier of PV module manufacturing equipment."*

– Roger Little

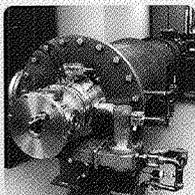
# Spire's History

A heritage of innovation

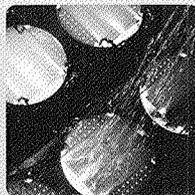
## 40 Years of Technological Innovation and Industry Leadership

Spire's involvement in the solar industry began nearly 40 years ago with development of space-based solar cells. Soon afterward, the energy crisis prompted interest and investment in terrestrial photovoltaics. Spire first manufactured high efficiency solar cells and modules, but because many well-capitalized oil companies entered the module market, Spire began manufacturing module production equipment to support this fledgling industry.

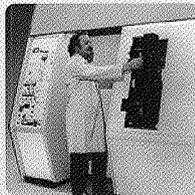
As the solar market grew slowly over the next two decades, Spire built a leading position as a worldwide supplier of solar cell and module manufacturing equipment with imbedded, advanced processes. The PV market has now entered a period of unprecedented expansion. As a leading, global supplier of PV manufacturing equipment with established brand recognition, Spire is in an excellent position to capitalize on this growth.



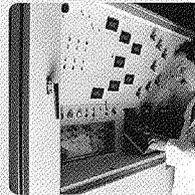
Spire Corporation builds its first SPI-PULSE™ electron beam generator to support research in radiation effects testing



U.S. government contract brings Spire into space solar cell research



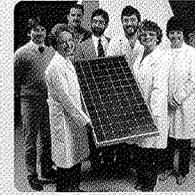
Energy crisis causes U.S. to consider PV for terrestrial applications and Spire receives its first terrestrial solar cell contract



Spire receives contract to use pulsed electron beams to improve GaAs-on-silicon solar cells grown by metalorganic chemical vapor deposition



Spire makes its photovoltaic module manufacturing equipment available for the first time



Spire produces 15% efficient PV module using ion implantation, a milestone for the PV industry

1970

**1969: Simulation Physics, Inc. (SPI) starts in Boxborough, MA**  
1 employee  
(founder Roger G. Little)  
**1969 sales: \$0**

1975

**SPI moves to Burlington, MA**  
34 employees  
**1974 sales: \$802,000**

1980

**SPI becomes Spire Corporation, moves to Patriots Park, Bedford, MA**  
64 employees  
**1977 sales: \$2,919,000**

1985

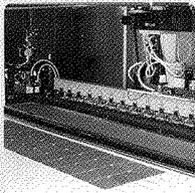
**Spire Corporation initial public offering December 1983**  
**1983 sales: \$5,759,000**

1990

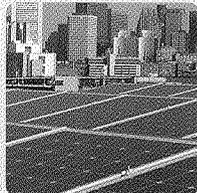
**Spire expands at Patriots Park, Bedford, MA**  
177 employees  
**1986 sales: \$12,604,000**



*Spire's history is rich with innovation:  
Innovation that has propelled the company and  
often served as a driving force in the solar industry.*



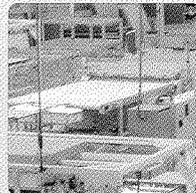
Spire advances high volume PV module manufacturing by developing an automated solar cell assembler



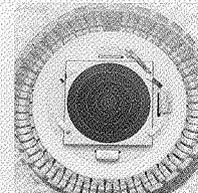
Spire Solar Systems established to provide design, installation, and integration services for large-scale PV systems



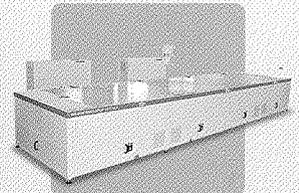
Spire introduces low-profile, inverted simulator that enables automation



Spire continues to expand turn-key cell and module line capabilities with the installation of a 50 MW, fully automated module production line



Spire develops world record 42.3% efficient concentrator solar cell



Spire delivers its 1000th piece of PV equipment to the industry

**1995**

**Spire 25th Anniversary**  
154 employees  
1994 sales:  
\$18,400,000

**Spire reaches \$20M in sales**  
162 employees  
1993 sales:  
\$20,135,000

**2000**

**Spire refocuses on core technology**  
88 employees  
1999 sales:  
\$8,905,000

**2005**

**Spire expands manufacturing operations in Bedford, MA facility, doubling floor space**  
2006 sales:  
\$20,125,000

**35th Anniversary**  
2004 sales:  
\$17,278,000

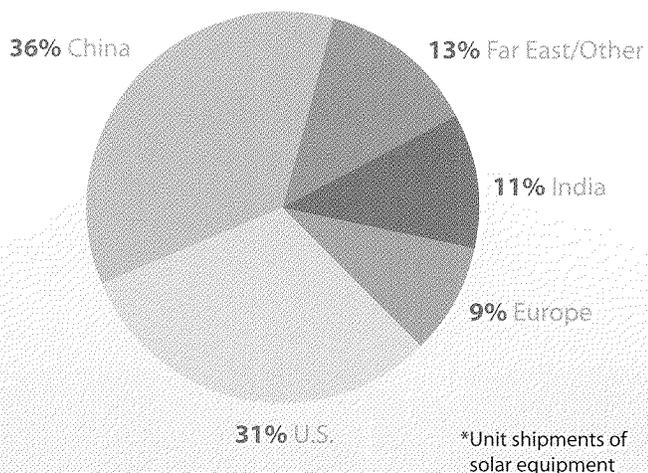
**2010**

**40th Anniversary**  
2009 sales:  
\$69,871,000

# Global Customers

To the solar industry we're global.  
To each customer we're local.

## Spire Business by Region\*



## 2010 Worldwide Tradeshow Presence



## A Worldwide Presence to Address a Global Market

The global solar photovoltaic market continues to grow at an astonishing rate. From 2009 to 2010 new installations more than doubled, from about 7.5 Gigawatts (GW) to about 16 GW, exceeding most analyst forecasts. In 2011, the solar market is projected to exceed 20 GW of new production. This is nearly three times larger than it was in 2009 and over six times larger than it was in 2007. By 2015, the market is expected to exceed 50 GW.

As the PV market grows it is becoming increasingly globalized. Historically, the market has been driven by Germany and other Western European countries. However, the rate of growth in Germany is expected to subside while other countries, such as the U.S., Italy, Japan, Canada and China, should experience strong growth in coming years. China is now the world's leading producer of solar modules, with five of the top ten producers located there.

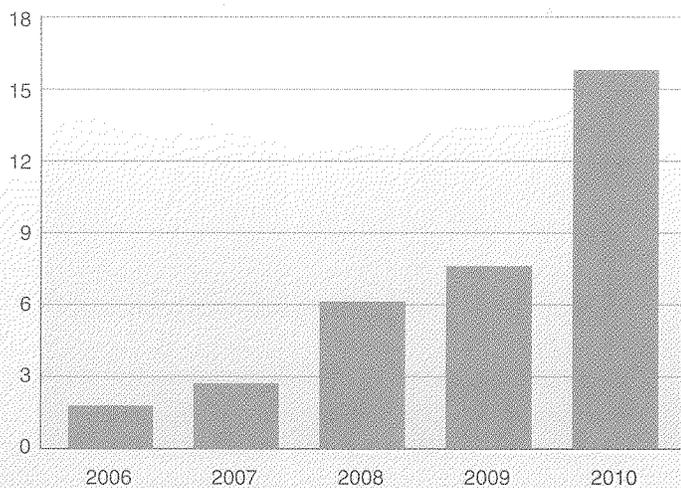
After nearly 40 years in the solar industry, Spire's reputation and international presence allows us to reach manufacturers in every area of the world. Spire has developed a global customer base with more than 200 customers in over 50 countries. In 2010, more than two-thirds of Spire's business was outside of the U.S., with about one-third in China.

*"[Spire's] process technology and proven ability to deliver made them the company to work with."*

- Hanwha Chemical Corporation, South Korea

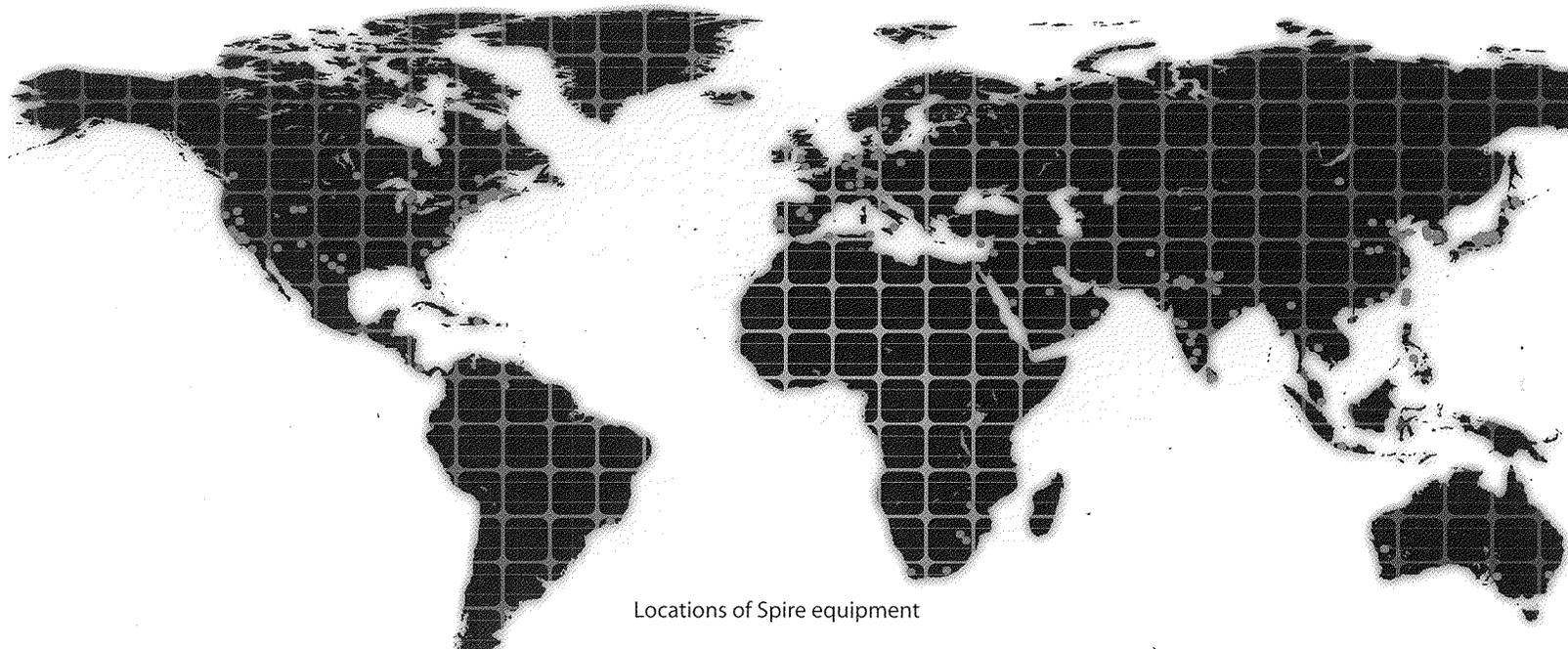


### Global PV Market (GW) – New Installations



*"We chose Spire for our equipment line because of their international reputation, and as a domestic manufacturer we can be assured of their support."*

–Mr. Pin Ni, President of Wanxiang America Corporation



Locations of Spire equipment

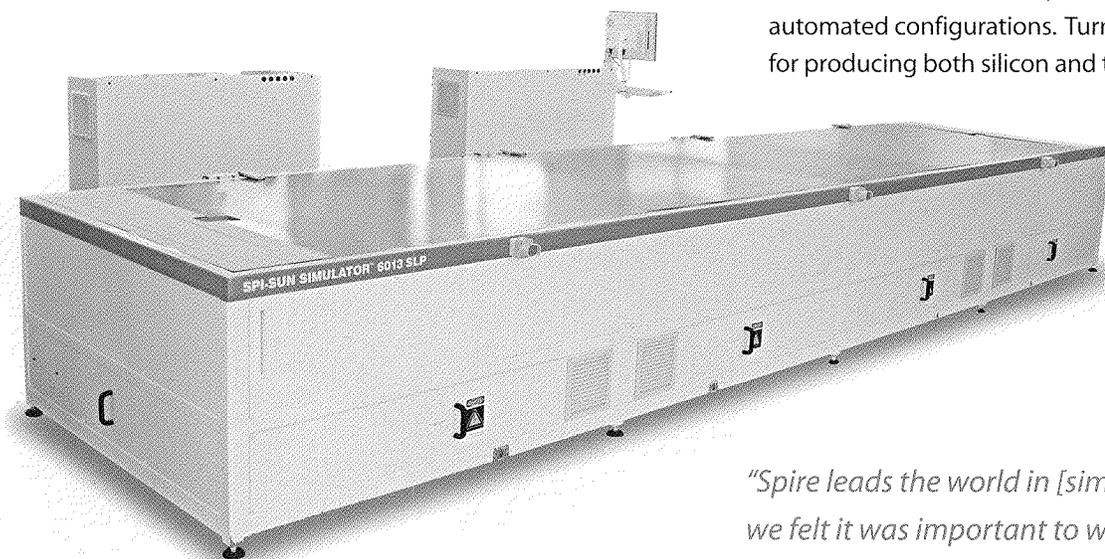
# Products & Services

Customer Success Driven by Knowledge and Experience

## Guidance Across the Solar Spectrum

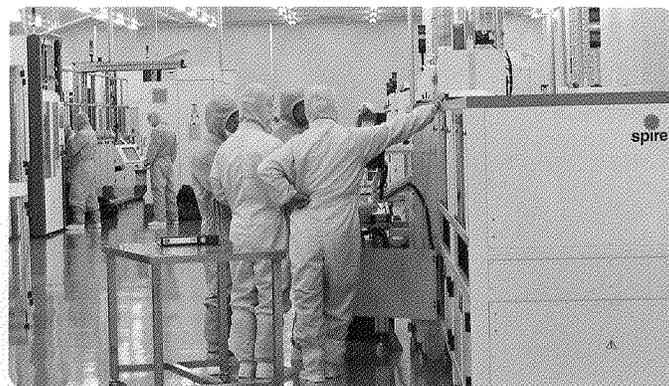
Spire continues to differentiate itself by focusing on the success of its customers. We realize that producing and selling high quality, state-of-the-art equipment is just the starting point. Optimal value for our customers is achieved only when our equipment allows them to effectively and efficiently compete in the market with their own products: solar cells and modules.

Spire shares its extensive knowledge and experience with our customers, supporting them across the wide range of activities necessary for them to succeed, including material procurement, facility layout, installation, training, process knowledge, module certification, marketing, and servicing. Spire's customers get more than just equipment for their factories; they obtain the knowledge and support necessary to optimize its use.



Spire offers custom equipment, such as this large-area simulator for thin film (CIGS) modules.

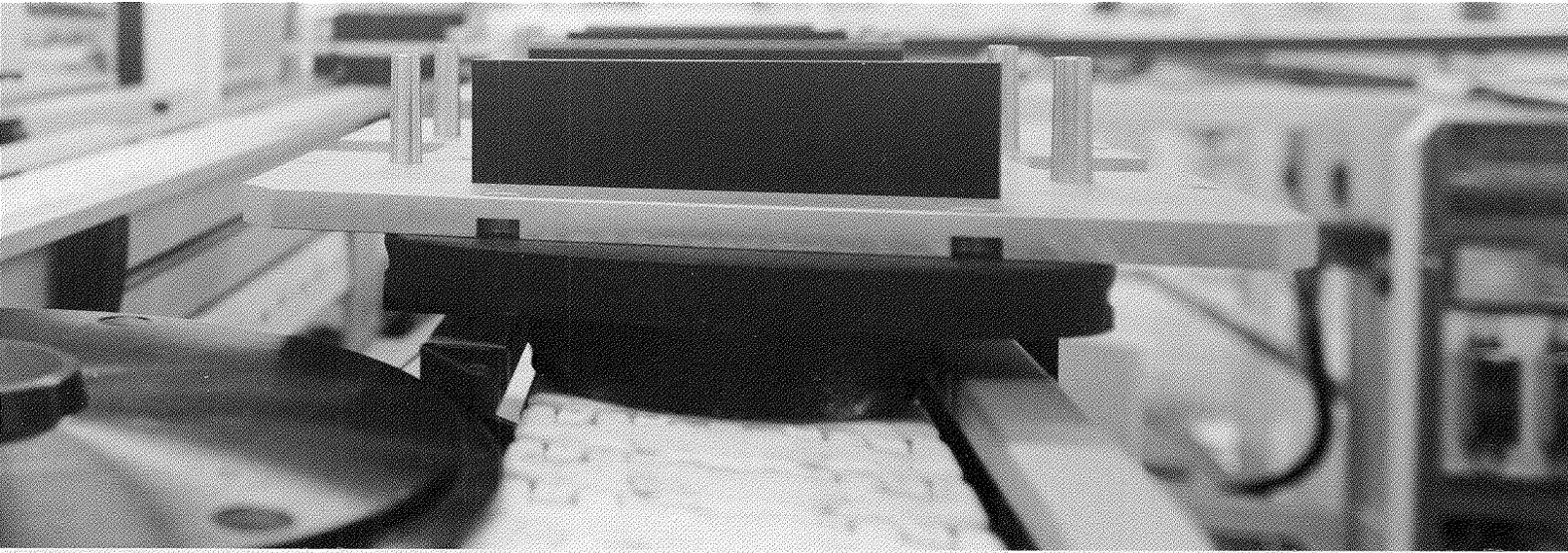
## Turn-key Lines



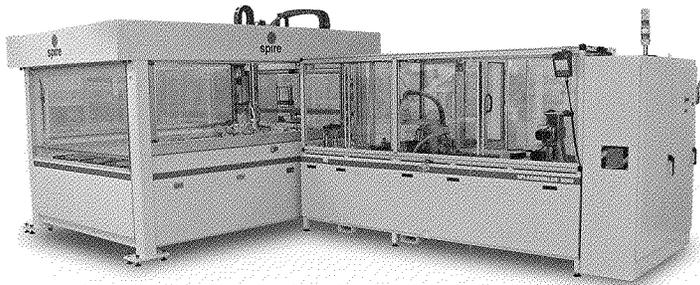
Spire's turn-key cell and module lines permit new companies to enter the market and existing customers to quickly and efficiently expand their capacity. Our flexible lines are available in a wide range of capacities (from several MW to over 200 MW), and are offered in manual, semi-automated, and fully automated configurations. Turn-key module lines are available for producing both silicon and thin film modules.

*"Spire leads the world in [simulator] technology and we felt it was important to work with the world leader in solar metrology on this key piece of our new factory."*

– Eric Culberson, Director of Factory Development at SoloPower



## Equipment



Spire's module manufacturing equipment has been developed and refined over many years in the industry. The Company's flagship product, the Spi-Sun solar simulator, has become the industry standard. It is now used by more than 30 standards testing laboratories worldwide and is a staple in production lines around the globe. Spi-Sun Simulators offer Class AAA performance with excellent spectral match and spatial uniformity, and extraordinary temporal stability over the life of the system. The systems can be used with crystalline or thin film modules and can be integrated into module production lines at any level of automation.

## Solar Systems



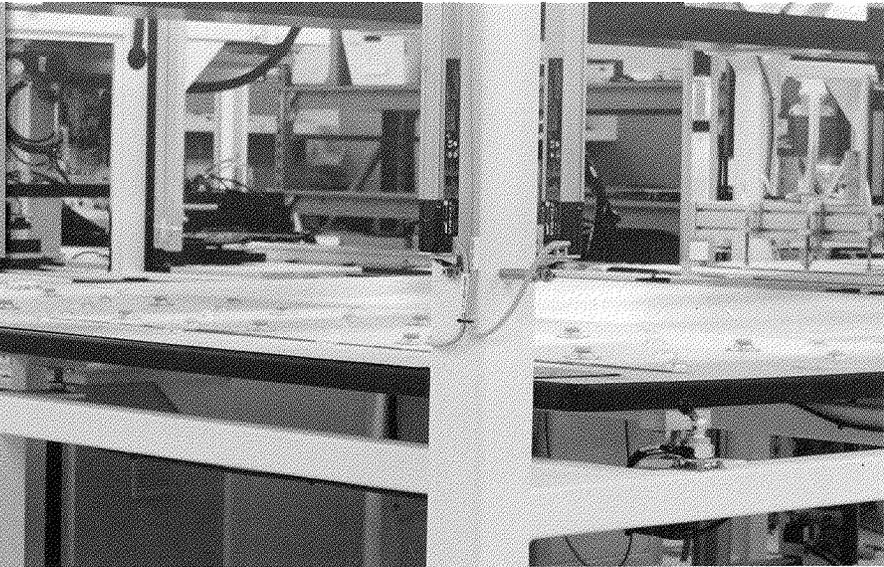
Spire Solar Systems provides module installation and integration services to the commercial and federal markets. We provide a full spectrum of technology, service, and manufacturing partners as well as engineering, procurement, construction and maintenance. We ensure that our clients achieve optimal results from their investment in both cost efficiency and energy production; and whenever possible we use modules produced by our equipment customers for the installations. Our in-house team of engineers, project managers, and financial experts has worked in the solar industry since its inception – providing a level of expertise made possible only by experience.

*"We have set the bar very high with our Spi-Sun Simulators. I am pleased that more than 30 test agencies including UL, NREL, TÜV, FSEC, CSA, KIER, Intervac, and Bodycote all use our simulators as their standard."*

–Roger G. Little,  
Chairman and CEO of Spire Corporation

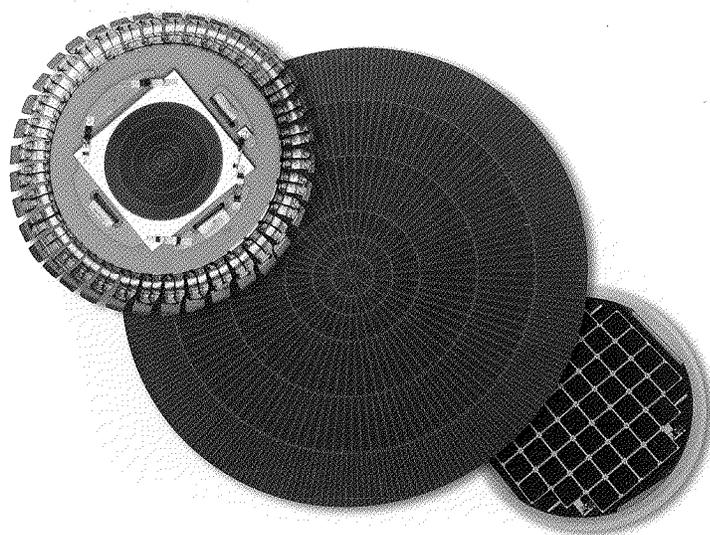
# Research & Development

Innovating for the future



## A New Record in Solar Cell Efficiency

In 2010, Spire produced the most efficient solar cell the world has ever seen. This concentrating PV cell was developed under contract to the Department of Energy's National Renewable Energy Laboratory (NREL) and was confirmed by NREL to convert 42.3% of incident sunlight to electricity. This is not new territory for Spire, as the Company previously held a world record for solar cell efficiency in 1985. Spire is positioning itself to provide these cells to concentrator photovoltaics (CPV) system manufacturers.



## Selected Financial Data

Years Ended December 31,	2010	2009	2008	2007	2006
	(in thousands, except per share amounts)				
<b>Condensed Consolidated Statements of Operations**</b>					
Net sales and revenues	\$79,842	\$69,871	\$64,964	\$37,068	\$20,125
Gain on termination of contracts	1,888	3,123	6,761	—	—
Gain on sale of trademarks	—	—	—	2,735	—
Income (loss) from continuing operations before income taxes and extraordinary gain	(3,043)	(10,905)	5,725	(4,111)	(8,151)
Income tax benefit (provision) – continuing operations	1,146	2,241	(270)	877	—
Net income (loss) from discontinued operations, net of tax	1,489	3,382	(680)	—	—
Extraordinary gain, net of tax	—	—	—	1,301	—
Net income (loss)	\$ (408)	\$ (5,282)	\$ 4,775	\$ (1,933)	\$ (8,151)
Basic income (loss) per share	\$ (0.05)	\$ (0.63)	\$ 0.57	\$ (0.23)	\$ (1.03)
Diluted income (loss) per share	\$ (0.05)	\$ (0.63)	\$ 0.56	\$ (0.23)	\$ (1.03)
Weighted average number of common and common equivalent shares outstanding – basic	8,341	8,334	8,329	8,272	7,898
Weighted average number of common and common equivalent shares outstanding – diluted	8,341	8,334	8,465	8,272	7,898

\*\* The Condensed Consolidated Statements of Operations for years 2007 and 2006 have not been adjusted for discontinued operations.

### Condensed Consolidated Balance Sheets

Cash and cash equivalents	\$ 6,259	\$ 8,999	\$ 5,971	\$ 2,372	\$ 1,536
Total assets	34,585	53,393	68,018	48,687	27,684
Working capital	5,166	3,718	6,835	2,587	3,938
Stockholders' equity	\$ 9,905	\$ 9,504	\$ 13,518	\$ 8,455	\$ 9,463

### STOCK EXCHANGE INFORMATION

The Company's common stock is traded on the NASDAQ Stock Market under the symbol "SPIR". On March 25, 2011, the common stock was held by 156 persons or entities of record including significant amounts of stock held in "street name." The Company did not pay any cash dividends during 2010 and currently does not intend to pay dividends in the foreseeable future so that it may reinvest its earnings in the development of its business.

### ANNUAL MEETING OF STOCKHOLDERS

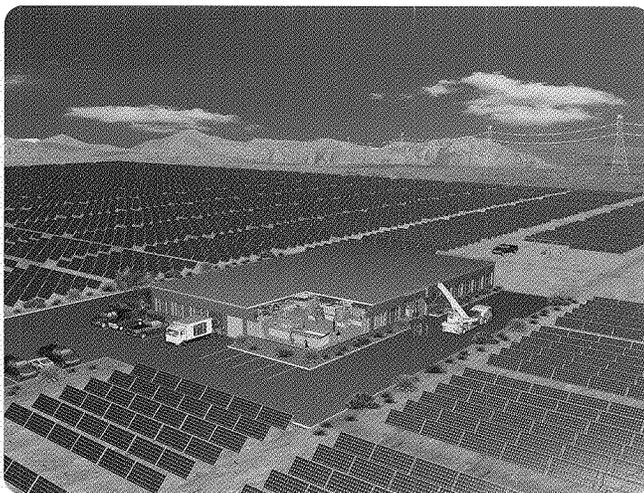
The Special Meeting in Lieu of the 2011 Annual Meeting of Stockholders is scheduled to be held at 10:00 a.m. on Thursday, May 19, 2011 at Spire Corporation, One Patriots Park, Bedford, Massachusetts.

### INVESTOR RELATIONS

For further information about the Company or additional copies of this annual report, Form 10-K or other information, visit the Company's website at [www.spirecorp.com](http://www.spirecorp.com). The Company will provide to any person without charge, upon request, a copy of the Form 10-K. Any person wishing a copy should write to Spire Corporation, Investor Relations, One Patriots Park, Bedford, Massachusetts 01730-2396.

### TRANSFER AGENT AND REGISTRAR

American Stock Transfer and Trust Company, LLC  
New York, NY



## Supersized Modules for U.S. Utility Applications

The U.S. solar utility PV market will experience rapid growth over the next decade with utilities expected to add over 20 GW of solar PV to their generation portfolios by 2020. Spire is developing "supersized" 1 kW photovoltaic modules targeting this emerging PV market segment. Significant cost savings can be realized via on-site or centrally located production of these larger crystalline silicon modules at or near solar "farm" locations in a distributed manufacturing model. Supersized modules will reduce materials costs, balance of system (BOS) costs, and installation expenses, which could translate to billions of dollars in savings for the industry.

### Executive Officers

- Stephen J. Hogan**  
Executive Vice President and  
General Manager, Spire Solar
- Rodger W. LaFavre**  
Chief Operating Officer
- Robert S. Lieberman, CPA**  
Chief Financial Officer and Treasurer
- Mark C. Little**  
Chief Executive Officer,  
Spire Biomedical
- Roger G. Little**  
Chairman of the Board,  
Chief Executive Officer  
and President

### Board of Directors

- Udo Henseler, Ph.D., CPA**  
President and proprietor  
Management Services International  
(business development services for  
biotechnology and life sciences firms)
- David R. Lipinski**  
Executive Vice President and  
Chief Financial Officer, KMS Solutions, LLC  
(a defense professional services enterprise)

#### **Mark C. Little**

Chief Executive Officer, Spire Biomedical  
Spire Corporation

#### **Roger G. Little**

Chairman of the Board,  
Chief Executive Officer and President  
Spire Corporation

#### **Michael J. Magliochetti, Ph.D.**

President, Chief Executive Officer and Director  
Claros Diagnostics, Inc.  
(a point-of-care diagnostic technology firm)

#### **Guy L. Mayer**

President, Chief Executive Officer and Director  
Ascension Orthopedics, Inc.  
(implant technology for the orthopedic  
extremities market)

#### **Roger W. Redmond, CFA**

Vice President and Senior Investment  
Manager  
Wells Fargo & Company  
(a financial services firm)

The Company's Form 10-K for the year ended December 31, 2010 filed with the Securities and Exchange Commission, contains an audited consolidated balance sheet of Spire Corporation and subsidiaries as of December 31, 2010 and the related consolidated statements of operations, stockholders' equity and comprehensive loss and cash flows for each of the years for the two-year period ended December 31, 2010.

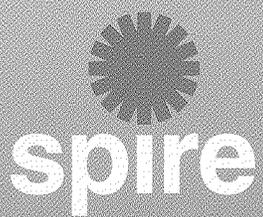
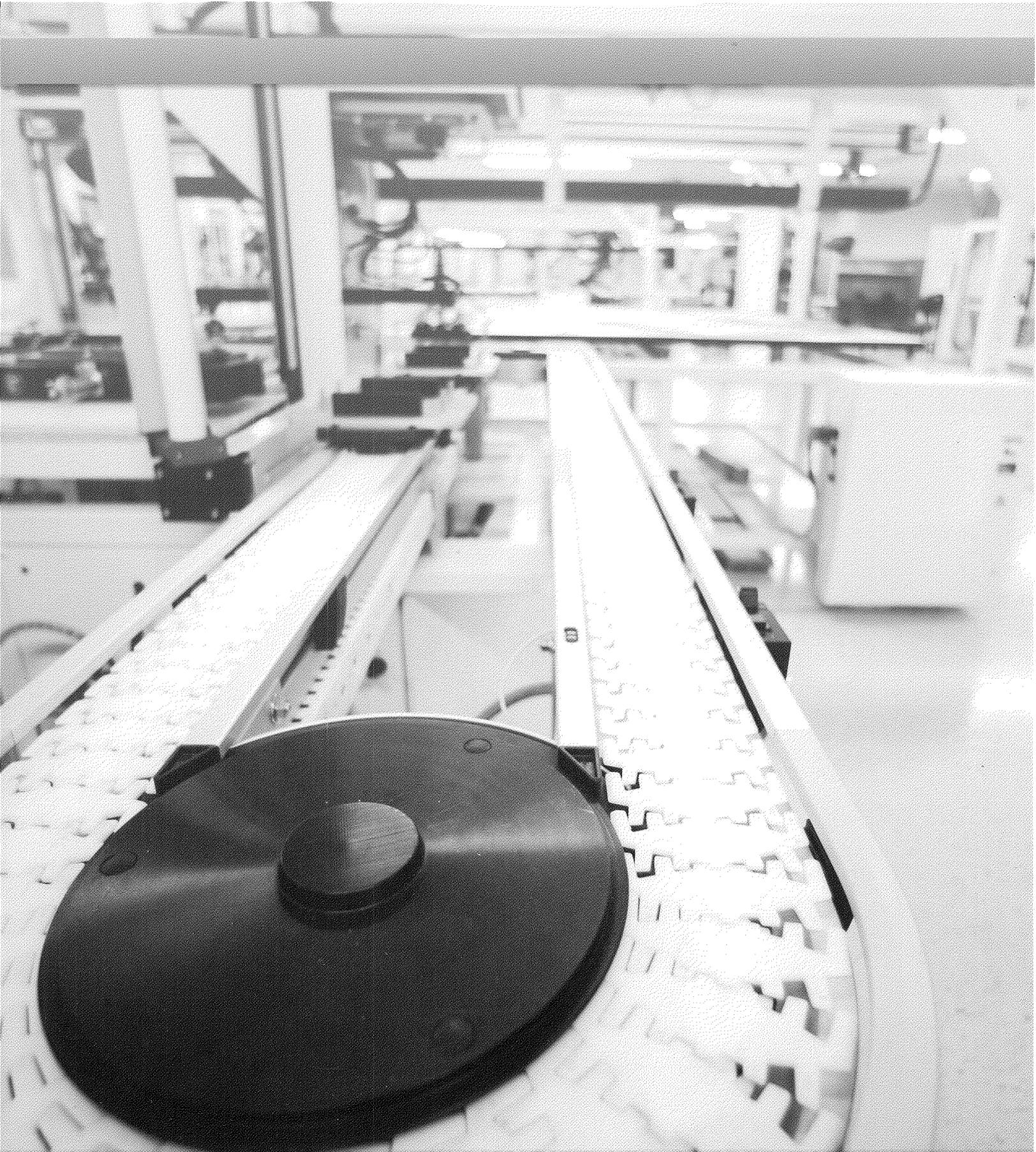
Certain matters described in this annual report, including those relating to Spire's prospects for growth, constitute forward-looking statements under the federal securities laws. The discussion of forward-looking information requires management of the Company to make certain estimates and assumptions regarding the Company's strategic duration and the effect of such plans on the Company's financial results. These forward-looking statements are subject to risks and uncertainties that could cause actual results to differ materially from those indicated in the forward-looking statements. Such risks and uncertainties include, but are not limited to, the risk of dependence on market growth, competition and dependence on government agencies and other third parties for funding contract research and services, as well as other factors described in the Company's Form 10-K and other periodic reports filed with the Securities and Exchange Commission. Forward-looking statements contained in the annual report speak only as of the date of this annual report. Subsequent events or circumstances occurring after such date may render these statements incomplete or out of date. The Company undertakes no obligation and expressly disclaims any duty to update such statements.

INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

McGladrey & Pullen, LLP  
Boston, MA

GENERAL COUNSEL

Greenberg Traurig, LLP  
Boston, MA



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